MEMORANDUM CIRCULAR
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SUBJECT: TECHNICAL STANDARDS ON SAMPLING PROTOCOL FOR SURVEILLANCE AND MOVEMENT PURPOSES IN EACH COLORED ZONES FOR AFRICAN SWINE FEVER (ASF)

The need for a cost efficient and science-based sampling technique are important to detect the presence of disease in a herd. In order to maximize the limited laboratory diagnostic tests while ensuring the appropriate sample size in a herd which can determine occurrence of ASF virus, this guideline is hereby issued to provide guidance on the different methods of sampling protocol for movement and surveillance purposes across different colored zone categories.

Annex A illustrates the different methods of sampling in each zone color and type of swine production system.

For your reference and information.

Done this 28ᵗʰ day of June 2022.

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Annex A. Sampling Protocol in Different Colored Zones for ASF

A. Sampling in the RED zones

Blood samples to be collected in these zones will be performed **every 90 days (RED Zones)** following the recommended sampling design.

A.1. Commercial farm

Farm Population: 100 animals

Using Freecalc at 6% design prevalence (BAI data as of March 2021), using perfect tests where Sensitivity and Specificity are 100%, if tests are imperfect, sample size may vary with a corresponding cut of number of reactors.

Sample size: 39 (See also Table 1 by Cannon and Roe)

In a farm, collect samples from 39 pigs chosen randomly either through simple or systematic sampling.

A.2. Backyard farms (barangay or clusters of barangays within a municipality)

1. Population: 1000 animal population in ASF affected areas

Using Freecalc at 6% design prevalence (BAI data as of March 2021), using perfect tests where Sn and Sp are 100%, if tests are imperfect, sample size may vary with a corresponding cut-off number of reactors

Sample size: 48 (See also Table 1)

Sampling unit: Pig

How to select the animals per barangays, use probability proportional to size sampling

Example:

Barangays	Distribution of animals per barangay				Number of Samples per barangay	
	If 1000	% Population	If 100	% Population	if 1000	if 100
A	200	20	20	20	10	9*
B	100	10	20	20	5	8
C	150	15	20	20	7	8
D	250	25	20	20	12	8
E	150	15	10	10	7	4

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E	150	15	10	10	7	4
F	150	15	10	10	7	4
Total	1000		100		48	39

*With one additional sample to complete the 39 samples required

a) From above table, get the list of farmers from each barangay and determine how many pigs each farmer was given to determine how many pigs will be sampled per farm.

Example:

Farmers within Brgy A	Inventory of pigs		Select	
	if 1000	if 100	Pig Number to be be sampled	Pig number to be sampled
Farmer A.1 (based on the list of LGU)	3	5	1-3 (3 pigs)	1-5 (5pigs)
Farmer A.2	50	3	4 – 10 (7pigs)	1-3 (3 pigs)
Farmer A.3.	20	22		1 (1 pig)
A.4.	10	10		
etc		20		
		30		
		10		

Note:
For 1000 animals: Since only 10 samples are needed for Barangay A given 1000 animal population, getting samples from Farmer A.1 and A.2 would be enough since their inventory is at 53 already.

For 100 sentinel animals: Since only 9 samples are needed for Barangay A, getting samples from Farmers A.1, A.2 A.3 would be enough since their inventory is at 30

B. Sampling in the PINK and YELLOW Zones

Blood samples to be collected in these zones will be performed every **90 days** following the prescribed sampling design.

B.1. Commercial Farms

Farm Population: 100,000

Using epitools at 2% design prevalence (so more samples can be tested), using perfect tests where Sn and Sp are 100%, if tests are imperfect, sample size may vary with a corresponding cut-off number of reactors

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Sample size: 149 (See also Table 1)
Sampling Unit: Farm

Scenario 1

Total swine population: 100,000

Prevalence is at 2%

Sample size based from the table: 149

Number of buildings: 5

Building	Population per building	% Population	Samples per building	How to select
A	15,000	15	22	15,000/22 = every 681 pig (since farms have records per pen, counting will just be based on the pen count of til you reach a pen where number 681 pig can be sampled; next pig will be pig 1362,etc)
B	20,000	20	30	
C	20,000	20	30	
D	25,000	25	37	
E	20,000	20	30	
			149	

Scenario 2

Total Swine Population 100,000
Prevalence at 2%
Sample size: 149

Instead of buildings, you can do by age group but include all age groups and follow similar process as above.

Age group	Population	% Population	Samples per age group
Breeder			
Piglets			

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Weaner			
Growers			

Scenario 3

Risk based
Determine which age groups are high risk in terms of movement of people, distance of houses, commonly shipped out, introduction of new breeds.

Include those pigs and that is your sampling frame. Then at 2%, population x you get the number of samples. You can do PPSS per age group or PPSS per housing of pigs that are high risk

Assumptions: farm has very good biosecurity and that houses are situated at a distance from each other

B.2. Backyard Farms

1. Do a 2-stage sampling. Construct sampling frame to include all barangays in the province (or municipality). Select barangays that are at high risk based on previous infection or proximity to infected area that will be included in the first stage.
2. Construct the sampling frame to include all farms in the selected barangays in the second stage.
3. Select the farms based on the calculated sample size (similar to above computation). In deciding how many farms to include per selected barangay, it can be equal or unequal proportion (probability proportional to size) in case there are barangays with many farms compared to others.
4. The final sample size (number of farms) in the province as well as the number of samples to be collected per farm may finally depend on the budget or laboratory capacity. Adjustment may be needed.

C. Sampling in the LIGHT GREEN AND DARK GREEN Zones

Blood samples to be collected in these zones will be performed every **180 days** following the prescribed sampling design.

Sampling protocols written in Sections B.1 and B.2 on commercial and backyard farms shall be followed.

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Table 1. Sample size required for detecting disease at 95% Confidence Level

Pop'n size (N)	(i) Percentage of diseased animals in population (d/N) OR (ii) Percentage sampled and found clean (n/N)												
	50%	40%	30%	25%	20%	15%	10%	6%	5%	2%	1%	0.5%	0.1%
10	4	5	6	7	8	10	10	10	10	10	10	10	10
20	4	6	7	9	10	12	16	19	19	20	20	20	20
30	4	6	8	9	11	14	19	24	26	30	30	30	30
40	5	6	8	10	12	15	21	29	31	40	40	40	40
50	5	6	8	10	12	16	22	31	35	48	50	50	50
60	5	6	8	10	12	16	23	34	38	55	60	60	60
70	5	6	8	10	13	17	24	35	40	62	70	70	70
80	5	6	8	10	13	17	24	37	42	68	79	80	80
90	5	6	8	10	13	17	25	38	43	73	87	90	90
100	5	6	9	10	13	17	25	39	45	78	96	100	100
120	5	6	9	10	13	18	26	40	47	86	111	120	120
140	5	6	9	11	13	18	26	41	48	92	124	139	140
160	5	6	9	11	13	18	27	42	49	97	136	157	160
180	5	6	9	11	13	18	27	43	50	101	146	174	180
200	5	6	9	11	13	18	27	43	51	105	155	190	200
250	5	6	9	11	14	18	27	44	53	112	175	228	250
300	5	6	9	11	14	18	28	45	54	117	189	260	300
350	5	6	9	11	14	18	28	46	54	121	201	287	350
400	5	6	9	11	14	19	28	46	55	124	211	311	400
450	5	6	9	11	14	19	28	46	55	127	218	331	450
500	5	6	9	11	14	19	28	47	56	129	225	349	500
600	5	6	9	11	14	19	28	47	56	132	235	379	597
700	5	6	9	11	14	19	28	47	57	134	243	402	691
800	5	6	9	11	14	19	28	47	57	136	249	421	782
900	5	6	9	11	14	19	28	48	57	137	254	437	868
1000	5	6	9	11	14	19	29	48	57	138	258	450	950
1200	5	6	9	11	14	19	29	48	57	140	264	471	1102
1400	5	6	9	11	14	19	29	48	58	141	269	487	1236
1600	5	6	9	11	14	19	29	48	58	142	272	499	1354
1800	5	6	9	11	14	19	29	48	58	143	275	509	1459
2000	5	6	9	11	14	19	29	48	58	143	277	517	1553
3000	5	6	9	11	14	19	29	49	58	145	284	542	1895
4000	5	6	9	11	14	19	29	49	58	146	268	556	2108
5000	5	6	9	11	14	19	29	49	59	147	290	564	2253
6000	5	6	9	11	14	19	29	49	59	147	291	569	2358
7000	5	6	9	11	14	19	29	49	59	147	292	573	2437
8000	5	6	9	11	14	19	29	49	59	147	293	576	2498
9000	5	6	9	11	14	19	29	49	59	148	294	579	2548
10,000	5	6	9	11	14	19	29	49	59	148	294	581	2588
∞	5	6	9	11	14	19	29	49	59	149	299	598	2995

Source: Cannon, R. & Roe, R. (1982). Livestock Disease Surveys: A Field Manual for Veterinarians. Australian Government Publishing Service, Canberra, Australia.

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